

Mastery Checklist

Function Operation

In order to prove Mastery for this concept you must be able complete the following all by **yourself**. No help from Notes, Partners or Teacher. Use all other problems to practice and test yourself with the following:

- Complete # 18,19, 22, 42, 54, & 57 on "Operations and Composition of Functions"
- Complete two problems from Level ** on "Adding and Subtracting Function Operations"
- Complete one from Level* and one from Level ** on "Multiplying and Dividing Function Operations"
- Complete one Level *** problem on Complex Rational Operations
- Create a Mind Map on Function Operations

Operations and Compositions of Functions :-)

Perform the indicated operation.

1) $g(a) = 4a - 1$
 $h(a) = a^2 + 5$
Find $g(h(a))$

2) $f(x) = 2x - 1$
 $g(x) = -3x^2 - 2x$
Find $(f \circ g)(x)$

3) $g(n) = -n - 3$
 $h(n) = n^2 + 1$
Find $(g \circ h)(n)$

4) $h(n) = -n - 1$
 $g(n) = n^2 - n$
Find $(h \circ g)(n)$

5) $h(t) = -2t - 5$
 $g(t) = -3t^2 - 2t$
Find $h(g(t))$

6) $f(a) = a - 2$
 $g(a) = -3a^2 - 1$
Find $(f \circ g)(a)$

7) $g(x) = 2x - 5$
 $f(x) = 4x + 2$
Find $g(f(x))$

8) $h(x) = -3x - 3$
 $g(x) = x^3 + 2x^2$
Find $(h \circ g)(x)$

9) $g(a) = a^2 + 3$
 $h(a) = 4a + 4$
Find $g(h(a))$

10) $f(x) = x^2 + 5$
 $g(x) = 3x + 3$
Find $f(g(x))$

11) $g(x) = x^3 - 1$
 $h(x) = -2x - 5$
Find $g(h(x))$

12) $h(x) = -3x^2 - 2x$
 $g(x) = 2x + 3$
Find $(h \circ g)(x)$

13) $g(n) = 4n - 4$
 $f(n) = 4n + 4$
Find $(g \circ f)(n)$

14) $g(x) = 3x - 1$
 $h(x) = -3x^3 - 3x^2$
Find $g(h(x))$

15) $f(x) = 2x - 4$
 $g(x) = x + 3$
Find $f(g(x))$

16) $g(x) = 4x + 5$
 $f(x) = 2x - 2$
Find $(g \circ f)(x)$

17) $f(x) = 3x - 5$
Find $f(f(x))$

18) $h(x) = -3x^2 - 4x$
 $g(x) = x + 5$
Find $h(g(x))$

19) $g(n) = 3n - 4$
 $f(n) = n^3 - 2n$
Find $(g \circ f)(n)$

20) $g(x) = 4x$
 $h(x) = x^3 + 5x^2$
Find $g(h(x))$

21) $f(x) = 3x$
 $g(x) = x - 5$
Find $f(x) + g(x)$

22) $f(n) = -3n + 2$
 $g(n) = 4n + 2$
Find $f(n) \cdot g(n)$

23) $f(n) = 3n + 1$
 $g(n) = n^2 + 4n$
Find $(f - g)(n)$

24) $g(a) = 2a - 5$
 $h(a) = a^3 - a$
Find $g(a) + h(a)$

25) $g(a) = 3a + 1$
 $h(a) = 4a + 2$
Find $g(a) \square h(a)$

26) $f(n) = 2n$
 $g(n) = n^2 - 5$
Find $f(n) - g(n)$

27) $f(n) = -2n - 2$
 $g(n) = 3n - 4$
Find $f(n) \cdot g(n)$

28) $g(x) = x^2 + 3$
 $h(x) = -4x$
Find $\left(\frac{g}{h}\right)(x)$

29) $g(x) = 2x + 1$
 $h(x) = x^3 + 2x$
Find $(g + h)(x)$

30) $g(x) = 3x^3 + 3x$
 $h(x) = 2x - 2$
Find $g(x) \square h(x)$

31) $f(a) = a^2 - 3$
 $g(a) = a - 4$
Find $f(a) \cdot g(a)$

32) $g(t) = 3t + 3$
 $f(t) = t + 5$
Find $g(t) \cdot f(t)$

33) $g(n) = 4n - 4$
 $f(n) = n^2 + 4n$
Find $g(n) + f(n)$

34) $h(n) = 4n - 4$
 $g(n) = n^3 + 1$
Find $h(n) + g(n)$

35) $g(t) = t + 2$
 $f(t) = t + 1$
Find $g(t) + f(t)$

36) $h(n) = 3n + 5$
 $g(n) = n + 3$
Find $(h - g)(n)$

37) $f(a) = a - 4$
 $g(a) = a^2 - a$
Find $\left(\frac{f}{g}\right)(a)$

38) $h(x) = x^2 - 5$
 $g(x) = 3x + 3$
Find $h(x) + g(x)$

39) $h(a) = -a^3 - 2a$
 $g(a) = 4a + 3$
Find $h(a) - g(a)$

40) $f(x) = 2x - 4$
 $g(x) = -x^2 - x$
Find $f(x) \square g(x)$

41) $f(n) = 3n - 4$
 $g(n) = 2n - 1$
Find $(4f - g)(n)$

42) $g(x) = x + 4$
 $f(x) = 3x^2 + 5$
Find $-5g(x) - 3f(x)$

43) $f(x) = x + 5$
 $g(x) = x^3 - x^2 + x$
Find $(f - 3g)(x)$

44) $g(n) = 3n - 5$
 $h(n) = n^2 - 5n$
Find $(4g + 4h)(n)$

45) $f(x) = -x^2 + 5$
 $g(x) = 2x$
Find $2f(x) + 3g(x)$

46) $h(x) = 2x^3 + x^2$
 $g(x) = 3x + 5$
Find $2h(x) + 2g(x)$

47) $f(x) = x^2 - x$
 $g(x) = 3x + 2$
Find $(2f - 4g)(x)$

48) $g(a) = 4a - 4$
 $f(a) = 4a + 1$
Find $-3g(a) - 5f(a)$

49) $h(n) = n + 1$
 $g(n) = n^2 - 1$
Find $h(n) - 2g(n)$

50) $g(x) = 3x - 3$
 $h(x) = x^3 - 4x$
Find $(5g - 3h)(x)$

51) $f(n) = n - 4$
 $g(n) = 2n$
Find $3f(n) + 5g(n)$

52) $h(x) = -2x + 4$
 $g(x) = x^3 - 2x$
Find $(4h + g)(x)$

53) $f(n) = -4n - 3$
 $g(n) = n^2 - 3n$
Find $5f(n) - g(n)$

54) $g(x) = 2x + 2$
 $f(x) = x^3 + 5$
Find $(3g - 3f)(x)$

55) $h(t) = 2t^2 + 2t$
 $g(t) = -t - 4$
Find $(3h + 2g)(t)$

56) $f(x) = -3x^2 + 4 + 2x$
 $g(x) = 4x - 5$
Find $3f(x) - g(x)$

57) $g(t) = 2t - 5$
 $f(t) = t^3 + 3t$
Find $(3g + f)(t)$

58) $g(t) = -t^2 + 4$
 $h(t) = -t - 2$
Find $(3g - 4h)(t)$

59) $g(x) = 2x + 3$
 $f(x) = x - 4$
Find $g(x) - 4f(x)$

60) $h(x) = x^3 - 5x^2$
 $g(x) = 4x - 5$
Find $(2h - 2g)(x)$

61) $f(n) = -n - 5$
 $g(n) = n - 3$
Find $f(g(-3))$

62) $f(x) = x^2 - 1$
 $g(x) = -4x$
Find $f(7) - 2g(7)$

63) $g(x) = x^2 + 5x$
 $h(x) = 3x - 3$
Find $(g - h)(-10)$

64) $g(t) = 4t - 4$
 $h(t) = -t^3 - 5t^2$
Find $g(-5) \cdot h(-5)$

65) $g(n) = 2n - 4$
 $h(n) = -2n + 2$
Find $(g - 5h)(4)$

66) $f(x) = x + 4$
 $g(x) = 2x + 2$
Find $(f + g)(-8)$

67) $f(x) = 4x + 2$
 $g(x) = 2x + 4$
Find $f(-9) + g(-9)$

68) $g(t) = t^2 + 2t$
 $h(t) = 3t - 3$
Find $g(0) \cdot h(0)$

69) $g(n) = 3n + 3$
 $h(n) = 2n + 3$
Find $g(-9) \square h(-9)$

70) $f(x) = 3x + 1$
 $g(x) = x^3 - x$
Find $(f - g)(-1)$

71) $f(t) = -2t$
 $g(t) = t^2 - 4t$
Find $(f - g)(9)$

72) $g(n) = -3n^2 + 2n$
 $f(n) = n + 2$
Find $g(10) \square f(10)$

73) $h(n) = -2n + 3$
 $g(n) = 4n$
Find $(h \circ g)(-2)$

74) $f(a) = 3a - 3$
 $g(a) = -2a^2 + 6a$
Find $(-5f - 2g)(6)$

75) $g(x) = x^2 - 2 - x$
 $h(x) = 2x - 2$
Find $(5g + 2h)(-2)$

76) $h(x) = 3x - 1$
 $g(x) = x^2 - 1$
Find $h(9) + g(9)$

77) $f(t) = 2t - 1$
 $g(t) = 3t - 3$
Find $f(6) \cdot g(6)$

78) $g(n) = n^2 + 5n$
 $h(n) = -4n$
Find $(g \cdot h)(-4)$

79) $h(x) = 4x - 1$
 $g(x) = x^2 - x$
Find $(h + g)(7)$

80) $g(a) = 4a - 2$
 $h(a) = a^3 + 3a^2$
Find $\left(\frac{g}{h}\right)(-5)$

81) $f(t) = -3t - 4$
 $g(t) = 2t$
Find $f(-2t) - g(-2t)$

82) $g(x) = 2x - 4$
 $f(x) = 4x + 3$
Find $g(f(3 + x))$

83) $f(n) = 4n - 5$
 $g(n) = n + 4$
Find $(f - g)(n + 3)$

84) $g(x) = x^3 - 5x^2 - x$
 $f(x) = x + 1$
Find $g(f(x^2))$

85) $f(n) = 2n + 1$
 $g(n) = n^2 + n$
Find $f\left(\frac{n}{3}\right) \cdot g\left(\frac{n}{3}\right)$

86) $g(a) = 4a - 3$
 $h(a) = a^2 + 2a$
Find $g(z - 4) \square h(z - 4)$

87) $f(a) = 3a^2 - 1$
 $g(a) = 2a - 5$
Find $f(z^2) \cdot g(z^2)$

88) $g(t) = -t + 4$
 $f(t) = 4t - 3$
Find $g(4t) + f(4t)$

89) $g(n) = 3n + 3$
 $f(n) = -n - 2$
Find $g(-4n) + f(-4n)$

90) $f(x) = x + 5$
 $g(x) = 2x - 5$
Find $\left(\frac{f}{g}\right)(2b)$

91) $h(a) = 2a - 4$
 $g(a) = a^3 - 5a^2$
Find $2h(-a) + 2g(-a)$

92) $f(a) = 2a + 4$
 $g(a) = 3a + 4$
Find $f(-4a) \square g(-4a)$

93) $g(x) = 4x + 2$
 $h(x) = x^2 - 4x$

Find $(g \circ h)\left(\frac{n}{4}\right)$

94) $h(n) = 3n$
 $g(n) = n^3 + 2n^2$
Find $(h - g)(-n)$

95) $h(n) = 2n + 2$
 $g(n) = 2n^2 + n$
Find $(h - g)(-2n)$

96) $g(x) = 2x + 1$
 $h(x) = x^2 + 2x$
Find $(g \circ h)(x + 3)$

97) $h(a) = 4a$
 $g(a) = 2a + 3$
Find $(h \cdot g)(4a)$

98) $h(n) = -n + 3$
 $g(n) = -2n + 2$
Find $h\left(\frac{n}{3}\right) \cdot g\left(\frac{n}{3}\right)$

99) $f(n) = 3n^2 - 2n$
 $g(n) = -n - 1$
Find $f(3 + n) - 5g(3 + n)$

100) $g(n) = n + 4$
 $f(n) = n^2 + 5n$
Find $(5g + 3f)\left(\frac{z}{2}\right)$

Answers to Operations and Compositions of Functions :-)

- 1) $4a^2 + 19$ 2) $-6x^2 - 4x - 1$ 3) $-n^2 - 4$ 4) $-n^2 + n - 1$
 5) $6t^2 + 4t - 5$ 6) $-3a^2 - 3$ 7) $8x - 1$ 8) $-3x^3 - 6x^2 - 3$
 9) $16a^2 + 32a + 19$ 10) $9x^2 + 18x + 14$ 11) $-8x^3 - 60x^2 - 150x - 126$
 12) $-12x^2 - 40x - 33$ 13) $16n + 12$ 14) $-9x^3 - 9x^2 - 1$ 15) $2x + 2$
 16) $8x - 3$ 17) $9x - 20$ 18) $-3x^2 - 34x - 95$ 19) $3n^3 - 6n - 4$
 20) $4x^3 + 20x^2$ 21) $4x - 5$ 22) $-12n^2 + 2n + 4$ 23) $-n^2 - n + 1$
 24) $a^3 + a - 5$ 25) $\frac{3a + 1}{4a + 2}$ 26) $-n^2 + 2n + 5$ 27) $-6n^2 + 2n + 8$
 28) $\frac{-x^2 - 3}{4x}$ 29) $x^3 + 4x + 1$ 30) $\frac{3x^3 + 3x}{2x - 2}$ 31) $a^3 - 4a^2 - 3a + 12$
 32) $3t^2 + 18t + 15$ 33) $n^2 + 8n - 4$ 34) $n^3 + 4n - 3$ 35) $2t + 3$
 36) $2n + 2$ 37) $\frac{a - 4}{a^2 - a}$ 38) $x^2 + 3x - 2$ 39) $-a^3 - 6a - 3$
 40) $\frac{2x - 4}{-x^2 - x}$ 41) $10n - 15$ 42) $-9x^2 - 5x - 35$
 43) $-3x^3 + 3x^2 - 2x + 5$ 44) $4n^2 - 8n - 20$ 45) $-2x^2 + 6x + 10$
 46) $4x^3 + 2x^2 + 6x + 10$ 47) $2x^2 - 14x - 8$ 48) $-32a + 7$
 49) $-2n^2 + n + 3$ 50) $-3x^3 + 27x - 15$ 51) $13n - 12$ 52) $x^3 - 10x + 16$
 53) $-n^2 - 17n - 15$ 54) $-3x^3 + 6x - 9$ 55) $6t^2 + 4t - 8$ 56) $-9x^2 + 2x + 17$
 57) $t^3 + 9t - 15$ 58) $-3t^2 + 4t + 20$ 59) $-2x + 19$
 60) $2x^3 - 10x^2 - 8x + 10$ 61) 1 62) 104
 63) 83 64) 0 65) 34 66) -18
 67) -48 68) 0 69) $\frac{8}{5}$ 70) -2
 71) -63 72) $-\frac{70}{3}$ 73) 19 74) -3
 75) 8 76) 106 77) 165 78) -64
 79) 69 80) $\frac{11}{25}$ 81) $10t - 4$ 82) $8x + 26$
 83) $3n$ 84) $x^6 - 2x^4 - 8x^2 - 5$ 85) $\frac{9n^2 + 9n + 2n^3}{27}$ 86) $\frac{4z - 19}{z^2 - 6z + 8}$
 87) $6z^6 - 15z^4 - 2z^2 + 5$ 88) $12t + 1$ 89) $-8n + 1$
 90) $\frac{2b + 5}{4b - 5}$ 91) $-2a^3 - 10a^2 - 4a - 8$ 92) $\frac{-2a + 1}{-3a + 1}$
 93) $\frac{8 - 16n + n^2}{4}$ 94) $n^3 - 2n^2 - 3n$ 95) $-8n^2 - 2n + 2$ 96) $2x^2 + 16x + 31$
 97) $128a^2 + 48a$ 98) $\frac{54 - 24n + 2n^2}{9}$ 99) $3n^2 + 21n + 41$ 100) $\frac{80 + 40z + 3z^2}{4}$

Complex Composite functions

Find $f(g(x))$ and $g(f(x))$.

1. $f(g(x)) = \sqrt{9-x^2} + 3$

$g(f(x)) = \sqrt{-x^2 - 6x}$

2. $f(g(x)) = \sqrt{2x-2}$

$g(f(x)) = 2\sqrt{x+3} - 5$

3. $f(g(x)) = \frac{-3(x-2)}{x}$

$g(f(x)) = \frac{3}{x-2}$

4. $f(g(x)) = x - 3$

$g(f(x)) = \sqrt{x^2 - 3}$

5. $f(g(x)) = \frac{2(x+2)}{3x+1}$

$g(f(x)) = \frac{5(x-3)}{2x-4}$

6. $f(g(x)) = \frac{1}{\sqrt{x^2-3}-2}$

$g(f(x)) = \frac{1}{(\sqrt[3]{x}-2)^2} - 3$

Find $f(g(x))$ and $g(f(x))$.

1. $f(x) = x + 3$

$g(x) = \sqrt{9 - x^2}$

2. $f(x) = \sqrt{x + 3}$

$g(x) = 2x - 5$

3. $f(x) = \frac{-3}{x}$

$g(x) = \frac{x - 2}{x}$

4. $f(x) = x^2 + 2$

$g(x) = \sqrt{x - 5}$

5. $f(x) = \frac{x - 3}{2}$

$g(x) = \frac{x + 2}{5}$

6. $f(x) = \frac{1}{\sqrt{x - 2}}$

$g(x) = x^2 - 3$

Level *

1.)
$$\frac{x^2 - 16}{x^2} \cdot \frac{x^2 - 4x}{x^2 - x - 12}$$

2.)
$$\frac{y^2 - 16}{2y + 6} \cdot \frac{y + 3}{y - 4}$$

3.)
$$\frac{x^2 - 2x - 35}{2x^3 - 3x^2} \cdot \frac{4x^3 - 9x}{7x - 49}$$

4.)
$$\frac{x^2 - y^2}{x^3 - y^3} \cdot \frac{x^2 + xy + y^2}{x^2 + 2xy + y^2}$$

Level **

5.)
$$\frac{3y+15}{y} \div \frac{y+5}{y}$$

6.)
$$\frac{y^2-9}{y} \div \frac{y+3}{y+2}$$

7.)
$$\frac{4a^2-1}{a^2-4} \div \frac{2a-1}{a-2}$$

8.)
$$\frac{x^3-64}{x^3+64} \div \frac{x^2-16}{x^2-4x+16}$$

Answer Key

LT: 6B Function Operations (Rational Functions)

Multiplying and Dividing

1.) $\frac{(x+4)(x-4)}{x(x+3)}$

2.) $\frac{y+4}{2}$

3.) $\frac{(x+5)(2x+3)}{7x}$

4.) $\frac{1}{x+y}$

5.) 3

6.) $\frac{(y-3)(y+2)}{y}$

7.) $\frac{2a+1}{a+2}$

8.) $\frac{x^2+4x+16}{(x+4)^2}$

Factor to cancel

1.) $\frac{x^2-16}{x^2} \cdot \frac{x^2-4x}{x^2-x-12} = \frac{(x+4)\cancel{(x-4)}}{x^2} \cdot \frac{\cancel{x}(x-4)}{\cancel{(x-4)}(x+3)}$

$\boxed{\frac{(x+4)(x-4)}{x(x+3)}}$ most simplified form.

5.) $\frac{3y+15}{y} \div$

$\frac{y+5}{y} = \frac{3(y+5)}{y} \div \frac{y+5}{y}$

$= \frac{3\cancel{(y+5)}}{y} \cdot \frac{\cancel{y}}{\cancel{(y+5)}}$

In order to \div fractions, mult. by reciprocal

$\boxed{3}$ most simplified form

LT: 6B Function Operations (Rational Functions)
Adding and Subtracting

Level *

$$1.) \frac{3y}{x} + \frac{5y}{x}$$

$$2.) \frac{-9y}{x+y} + \frac{16y}{x+y}$$

$$3.) \frac{25xy}{x^2+y^2} - \frac{16xy}{x^2+y^2}$$

$$4.) \frac{a-3b}{a+b} + \frac{a+5b}{a+b}$$

$$5.) \frac{a^2}{a-b} + \frac{b^2}{b-a}$$

$$6.) \frac{3}{x} - \frac{8}{-x}$$

$$7.) \frac{2x-10}{x^2-25} - \frac{5-x}{25-x^2}$$

$$8.) \frac{4xy}{x^2-y^2} + \frac{x-y}{x+y}$$

$$9.) \frac{9x+2}{3x^2-2x-8} + \frac{7}{3x^2+x-4}$$

Level **

$$10.) \frac{4}{x+1} + \frac{x+2}{x^2-1} + \frac{3}{x-1}$$

$$11.) \frac{x-1}{3x+15} - \frac{x+3}{5x+25}$$

$$12.) \frac{5ab}{a^2-b^2} - \frac{a-b}{a+b}$$

$$13.) \frac{3y+2}{y^2+5y-24} + \frac{7}{y^2+4y-32}$$

$$14.) \frac{3x-1}{x^2+2x-3} - \frac{x+4}{x^2-9}$$

$$15.) \frac{1}{x+1} - \frac{x}{x-2} + \frac{x^2+2}{x^2-x-2}$$

Answer Key

LT: 6B Function Operations (Rational Functions)
Adding and Subtracting

- 1.) $\frac{8y}{x}$
- 2.) $\frac{7y}{x+y}$
- 3.) $\frac{9xy}{x^2+y^2}$
- 4.) 2
- 5.) $a+b$
- 6.) $\frac{11}{x}$
- 7.) $\frac{1}{x+5}$
- 8.) $\frac{x+y}{x-y}$
- 9.) $\frac{3x-4}{(x-2)(x-1)}$
- 10.) $\frac{8x-1}{x^2-1}$
- 11.) $\frac{2x-14}{15x+75}$

5.) $\frac{a^2}{a-b} + \frac{b^2}{b-a} = \frac{a^2}{a-b} + \frac{b^2}{-a+b}$ *(need LCD)*
 $= \frac{a^2}{a-b} + \frac{b^2}{-(a-b)}$ *(need to factor out neg.)*
 $= \frac{a^2 + -b^2}{a-b}$ *(move neg to top bec it's factored out)*
 $= \frac{a^2 - b^2}{a-b}$ *($a^2 - b^2 = (a+b)(a-b)$)*
 $= \frac{(a+b)(a-b)}{a-b}$ *($\frac{a-b}{a-b} = 1$)*
 $= \boxed{a+b}$ *(most simplified form)*

- 12.) $\frac{-a^2+7ab-b^2}{a^2-b^2}$
- 13.) $\frac{3y^2-3y-29}{(y-3)(y+8)(y-4)}$
- 14.) $\frac{2x^2-13x+7}{(x+3)(x-1)(x-3)}$
- 15.) 0

10.) $\frac{4}{x+1} + \frac{x+2}{x^2-1} + \frac{3}{x-1} = \frac{4}{x+1} + \frac{x+2}{(x+1)(x-1)} + \frac{3}{x-1}$ *LCD: (x+1)(x-1)*
 $= \frac{4 \cdot (x-1)}{(x+1)(x-1)} + \frac{x+2}{(x+1)(x-1)} + \frac{3 \cdot (x+1)}{(x-1)(x+1)}$ *(combine like terms)*
 $= \frac{4x-4 + x+2 + 3x+3}{(x+1)(x-1)}$
 $= \frac{8x+1}{(x+1)(x-1)}$ *(either works.)*
 $= \frac{8x+1}{x^2-1}$

Level ***

$$1.) \frac{\frac{1}{x} + 4}{\frac{1}{1-3} - \frac{3}{x}}$$

$$2.) \frac{x - \frac{1}{x}}{x + \frac{1}{x}}$$

$$3.) \frac{\frac{3}{x} + \frac{4}{y}}{\frac{4}{x} - \frac{3}{y}}$$

$$4.) \frac{\frac{x^2 - y^2}{xy}}{\frac{x - y}{y}}$$

$$5.) \frac{a - \frac{3a}{b}}{b - \frac{b}{a}}$$

$$6.) \frac{\frac{1}{a} + \frac{1}{b}}{\frac{a^2 - b^2}{ab}}$$

$$7.) \frac{x^{-3} - x}{x^{-2} - 1}$$

$$8.) \frac{\frac{y^2 - y - 6}{y^2 - 5y - 14}}{\frac{y^2 + 6y + 5}{y^2 - 6y - 7}}$$

Exercises

1. $\frac{1+4x}{1-3x}$ 2. $\frac{(x+1)(x-1)}{x^2+1}$ 3. $\frac{3y+4x}{4y-3x}$ 4. $\frac{x+y}{x}$

5. $\frac{a^2(b-3)}{b^2(a-1)}$ 6. $\frac{1}{a-b}$ 7. $\frac{1+x^2}{x}$ 8. $\frac{y-3}{y+5}$ 9. $\frac{1+x}{1-x}$

19. $\frac{5(y-x+2)}{6(x+2)}$ 21. $\frac{x}{x+1}$ 23. a 25. Answers may vary.

27. $\frac{x-1}{x}, x$

Mixed Review 29. -6 or 7

Need LCD on top and bottom

$$1) \frac{\frac{1}{x} + 4}{\frac{1}{x} - 3} = \frac{\frac{1}{x} + \frac{4}{1} \cdot \frac{x}{x}}{\frac{1}{x} - \frac{3}{1} \cdot \frac{x}{x}}$$

$$= \frac{\frac{1}{x} + \frac{4x}{x}}{\frac{1}{x} - \frac{3x}{x}}$$

$$= \frac{\frac{4x+1}{x}}{\frac{-3x+1}{x}}$$

$$= \frac{4x+1}{x} \cdot \frac{x}{-3x+1}$$

$$= \frac{4x+1}{-3x+1} \quad \text{or} \quad \frac{1+4x}{1-3x}$$

to divide fractions multiply by reciprocal

either works